In Defense of "Targeting" Some Dissent about Science

Erin J. Nash
Durham University
University of New South Wales

In a recent article in this journal—"Who's Afraid of Dissent?"—Immaculada de Melo-Martín and Kristen Intemann argue that "targeting" dissent about science that is perceived to be problematic is both misguided and dangerous. I contend that their argument is unsuccessful. I present the Probability Argument to demonstrate that, in some circumstances, targeting problematic dissent will be a sound and reasonable response. Moreover, because not targeting dissent can also be misguided and dangerous, and because there are risks associated with leaning too heavily on education as a solution, it will sometimes be the case that targeting dissent is the best all-things-considered option. I sketch what is required for a more nuanced and contextual approach to evaluating and responding to dissent.

1. Introduction

That we have recently transitioned into a post-truth political era is a common refrain. But the influence of false, inaccurate, and misleading claims on politics in western liberal democracies isn't novel. In their book, *Merchants of Doubt*, Oreskes and Conway (2010) expose the "Tobacco Strategy": the methods various actors have deployed, increasingly since the mid-twentieth century, to obscure the truth about scientific issues from the public, induce widespread ignorance and unwarranted doubt, and stall public responses to issues that can have significant consequences for people's lives. One aspect

Thank you to my reviewers for *Perspectives on Science* and for the particularly helpful criticisms and comments received from one of my anonymous reviewers. I am especially grateful to Wendy Parker, Peter Vickers, and Alison Wylie for their detailed feedback on (many) earlier drafts. Thanks also to my colleagues at the Centre for Humanities Engaging Science and Society, as well as Sally Davies, Katherine Furman, Fergus Green, and Anna Leuschner for valuable discussions, feedback, and suggestions. For Frida, who was lush company during the writing of this paper and who is sorely missed.

Perspectives on Science 2018, vol. 26, no. 3

doi:10.1162/posc_a_00277

of the Tobacco Strategy involves the propagation of falsehoods by actors dissenting from an expert consensus (Oreskes and Conway 2010).[1] The most infamous example, and the strategy's namesake, is the well-documented dissent of the tobacco industry, which for over half a century publicly denied the link between smoking and cancer (Michaels 2008). Thus, whilst there is no doubt that dissent in science, and about the empirical claims of scientists, can be extremely valuable, some dissent has almost certainly failed to contribute to, or has actively hindered, knowledge and scientific progress (Biddle and Leuschner 2015; Leuschner 2016; Biddle et al. 2017), and undermined non-epistemic goals and values too (Kitcher 2011). Some dissent is therefore problematic. For the purposes of this paper, I understand problematic dissent to be a communicative act about science that we have good reasons to think is unsubstantiated, or that misrepresents another's position, or first- or higher-order evidence, and that we reasonably believe constitutes a significant risk to some value(s).[2]

Scholars seem to agree that this type of dissent exists. However, there is currently deep disagreement about how we ought to respond to its expression and transmission, and whether certain types of responses help to facilitate progress, or actually undermine it. For instance, in a recent article in this journal—"Who's Afraid of Dissent?"—Inmaculada de Melo-Martín and Kristen Intemann (dMMI) agree that challenges to a scientific consensus by dissenting voices can have considerable negative consequences, including negative consequences to public policy (de Melo-Martín and Intemann 2014, pp. 596, 599). However, the purpose of their article is to argue that it is both misguided and dangerous to try to minimize or discourage the expression and transmission of dissent within the public knowledge system[3] that is perceived to be problematic. They label such minimizing or discouraging the "targeting"[4] of dissent. According to dMMI, targeting dissent is misguided because it fails to address what they diagnose as the real problem: the prevalence of false assumptions about the nature and role of scientific consensus, dissent, and evidence in policymaking (de Melo-Martín and

1. By "dissent" I mean the act of not accepting, or of rejecting, a conclusion that is widely or officially held—i.e., an expert consensus—and/or the act of asserting a claim that is inconsistent with an expert consensus. I take dissent to differ from mere disagreement in that disagreement takes place when people's opinions or beliefs fail to accord on some matter "X," but where no broad or official consensus can be said to exist regarding "X."

2. I say more about identifying problematic dissent in §6.

3. Kitcher (2011, p. 85) defines the public knowledge system as: "...that body of shared information on which people draw in pursuing their own projects."

4. I would prefer to use "checking" dissent instead, as I think "targeting" is an unduly loaded term. However, I will use dMMI's language of targeting within this article for consistency. But I will return to the issue of terminology in §6.

Intemann 2014, pp. 599–607, 609). Targeting dissent is also dangerous, dMMI argue, because it likely increases instances of problematic dissent, deprives us of resources to criticize special interest science, and stifles legitimate dissent that is crucial to scientific progress and sound policy (de Melo-Martín and Intemann 2014, pp. 607–09). Consequently, dMMI conclude that scholars should turn their attention elsewhere to make progress (de Melo-Martín and Intemann 2014, p. 610), and propose correcting false beliefs about science-informed policy through education as an alternative intervention. Two more recent papers echo similar arguments. Pearce et al. (2017) and Intemann (2017) claim that efforts to communicate the expert consensus about empirical claims—among those strategies dMMI say constitute targeting dissent—is at best ineffective, and at worst has a deleterious impact on public policy. Whilst Pearce et al. characterize consensus messaging as a distraction from more urgent matters, Intemann warns that reinforcing what she argues are problematic assumptions about scientific consensus and its role in policymaking may undermine trust in science.

On the other side of the debate, science historian Naomi Oreskes (Oreskes 2004; Oreskes and Conway 2010; Oreskes 2017) and cognitive scientists Jonathan Cook (Cook et al. 2016; Cook 2017) and Sander van der Linden (van der Linden et al. 2014, 2015, 2016, 2017; van der Linden 2016), among others, hold that targeting problematic dissent in certain ways is sometimes a sound, reasonable, and legitimate response to the risks associated with problematic dissent, especially in contexts where powerful political actors have either deliberately manufactured unwarranted levels of doubt about scientists' empirical claims, or displayed a reckless disregard for the truth about empirical matters. To support their case, they point to research that suggests that misperceptions of, for example, an expert consensus about empirical claims can be consequential for policy, and that an improved understanding of the degree of consensus can lead to better engagement with empirical issues, and influence peoples' policy attitudes (e.g., Ding et al. 2011). Even more promising for their position, studies have also found that this outcome often holds across the political spectrum, and that information about the degree of consensus can sometimes neutralize the effect of a person's pre-existing worldview on the formation of their beliefs about empirical matters (Lewandowsky et al. 2013; van der Linden et al. 2014, 2016).

My aim here is to offer a less polarized perspective that integrates, rather than sets into competition, insights from both sides of the debate.[5] However, because I think some scholars have been too quick to dismiss the importance and legitimacy, in some contexts, of various responses that de Melo-Martín

5. Some of the scholars in this debate have already acknowledged their view that different approaches can coexist (e.g., Cook and van der Linden 2017).

and Intemann classify as targeting dissent, I will also be providing a qualified defense of certain targeting practices, including consensus messaging. I develop my case primarily via close critical engagement with dMMI's article, as I take it to be perhaps the key paper in this debate. Notably, it is unclear whether dMMI take targeting dissent to always be misguided and dangerous, or just generally so. Although they do not offer any such caveats, I will assume that they intend the latter, as it is more plausible. However, I argue that it is far from clear that even this weaker claim holds; I will show that in some—perhaps many—contexts, certain responses to problematic dissent that count as targeting are likely to be both sound and reasonable.

In the first part of this paper (§2–§3), after first clarifying what it means to target dissent and providing a more detailed overview of dMMI's argument that targeting dissent is misguided, I present an additional set of assumptions that dMMI overlook, which make targeting certain problematic dissent as an obstacle to public policy sound in some circumstances. I call this the "Probability Argument," as it focuses on the policy consequences of non-experts having distorted perceptions of the probabilities that pertinent hypotheses are correct. Before moving on, I raise and respond to two objections to the Probability Argument: that it does not guarantee that any changes to policy as a result of targeting problematic dissent will make for sound policy, and that the Probability Argument is simply the deficit model in disguise. Whilst I have developed the Probability Argument in an attempt to go some way towards resolving disagreements over the wisdom and ethics associated with targeting problematic dissent, it seems a useful framework for reasoning about science communication more generally. It also further clarifies the critical role and significance of higher-order evidence, a concept that has often been neglected in scholarship on science communication. As such, it has significance beyond just this corner of the philosophical and science studies literature.

In the second part of the paper (§4–§5), I examine dMMI's argument that targeting dissent is dangerous. I show that the same reasons dMMI provide to ground their argument that targeting dissent is dangerous also apply to not targeting dissent; as such, it remains very unclear whether targeting dissent, or not targeting dissent, will be riskier. I then move to considering de Melo-Martín and Intemann's education solution to problematic dissent. I argue that in many cases we have good reasons to doubt both that correcting false philosophies of science-informed policy will be effective, and that any approach heavily dependent on education will be sufficient and riskless in our non-ideal world. These arguments lead to further misgivings over the position that targeting problematic dissent is (generally) misguided and dangerous. I conclude, in §6, by showing that education activities are often not clearly distinct from strategies that target dissent and suggest that

this offers us some clues as to a way forward. I also provide guidance for reasoning about, identifying, and responding to problematic dissent, and raise what I see as important considerations for future scholarship.

I want to stress that this article does not make a general argument that pushes toward it being generally misguided and dangerous not to target dissent. Nor do I argue that targeting dissent is always or generally sound, or that targeting dissent is never risky or harmful; under certain circumstances, it surely is. I am simply calling attention to there being cases where targeting dissent is not misguided and dangerous, and where doing so will be a sound, reasonable, and legitimate response. I hope to push the discussion toward the development of a more contextual and nuanced approach to evaluating and responding to dissent.

2. What is "Targeting" Dissent?

According to dMMI, targeting dissent is any attempt to minimize or discourage dissent that is perceived to be problematic (de Melo-Martín and Intemann 2014, p. 593). They draw attention to three common targeting practices: First, dMMI say that dissent can be *masked*, when, for example, the full range of opinions that exist on some matter are not reported, or when a consensus position is emphasized (de Melo-Martín and Intemann 2014, pp. 596–97). As an illustration of the former, dMMI cite the example of scientists presenting only those general claims they all agree on to the public and policymakers, whilst simultaneously not conveying information about other claims they disagree about or downplaying their significance. As an example of the latter they point to efforts to quantify and highlight the scientific consensus on the existence of anthropogenic climate change. Second, dMMI point out that dissent that is perceived to be problematic can be *silenced* (de Melo-Martín and Intemann 2014, p. 597). According to dMMI, an example of silencing occurs when dissent is "...hindered through the peer-review process" (de Melo-Martín and Intemann 2014, p. 597). A prominent example of an explicit silencing of dissent within an academic journal was the *South African Medical Journal's* announcement that it would no longer accept articles containing certain dissident views on AIDS.[6] Third, dMMI note that dissenters can be *discredited,* when, for example, their financial and political ties to private industry or partisan think tanks are publicized (de Melo-Martín and Intemann 2014, p. 598). Oreskes and Conway's research on the "manufacturers of doubt" is raised again as an example of this practice. According to dMMI, not only does discrediting dissenters hinder dissent directly, but it also does so indirectly by deterring funding

6. See van Niekerk (2003). Thank you to Katherine Furman for providing this example.

agencies, publishers, and other scientists, from engaging with dissidents' work, or conducting, funding, or otherwise supporting, similar research.

These explanations and examples are not exhaustive of the kinds of activities that count as masking, silencing, and discrediting dissent and dissenters. I understand these categories to also include things like: the exclusion of some dissent from curricula, or emphasizing a consensus position rather than providing balanced lessons; non-academic media refusing to publish certain dissent, such as the decision of the *Los Angeles Times* to no longer publish letters claiming there is no evidence for anthropogenic climate change (Thornton 2013), and journalists discrediting scientists by revealing fraudulent scientific practices and undisclosed financial interests, as in Brian Deer's investigations of vaccine dissident Andrew Wakefield (Godlee et al. 2011). Nor are the three categories—masking, silencing, and discrediting—a comprehensive taxonomy of what constitutes targeting dissent; according to dMMI they simply represent three particularly common ways dissent is targeted. Now that we are clearer about what counts as targeting dissent, we can move to critically engaging with and evaluating dMMI's arguments.

3. Is it Misguided to Target Problematic Dissent?

The first of dMMI's two key arguments is that treating dissent about science as an obstacle to the development and enactment of public policy, and consequently targeting this dissent, is misguided (de Melo-Martín and Intemann 2014, pp. 599–607). dMMI contend that those who target dissent err because the means they deploy will not achieve their end. This is so, dMMI reason, because the decision to target dissent rests on unjustified assumptions about the nature of scientific consensus and dissent, and the role of each in policymaking (de Melo-Martín and Intemann 2014, p. 595). They focus on two assumptions—a scientific consensus is necessary (de Melo-Martín and Intemann 2014, pp. 599–604) and a scientific consensus is sufficient (de Melo-Martín and Intemann 2014, pp. 604–07) for sound policy—and claim that concerns about dissent are only plausible under these assumptions (de Melo-Martín and Intemann 2014, p. 599). dMMI argue that both of these assumptions are false (de Melo-Martín and Intemann 2014, p. 609), and therefore that targeting dissent is misguided because it will not actually facilitate sound policymaking. I will refer to these assumptions about the role of a scientific consensus in policymaking as false philosophies of science-informed policy.[7]

7. dMMI note other false philosophies of science-informed policy e.g., that: science needs to be certain (de Melo-Martín and Intemann 2014, p. 600); unanimous expert consensus is required (de Melo-Martín and Intemann 2014, p. 601); scientific knowledge is the

According to dMMI, it is the prevalence of these particular false beliefs amongst non-experts that is the most fundamental issue (de Melo-Martín and Intemann 2014, p. 604), and therefore the real problem (de Melo-Martín and Intemann 2014, p. 609); the dissenting communicative acts themselves are, dMMI assert, the wrong targets of concern (de Melo-Martín and Intemann 2014, p. 599). They claim:

> If our arguments are correct, the problem is *not* with the dissent as such, even dissent that is not epistemically valuable, but with an *incorrect* understanding of the nature of consensus and dissent and their role in sound public policymaking. Addressing the *real* problem should be our aim. (de Melo-Martín and Intemann 2014, p. 609, emphasis added)

Note that dMMI are making causal claims here, including a claim about which causal factor is the predominant or most fundamental driver of unsound policy (i.e., an attribution claim). Based upon this understanding of the causal mechanism, dMMI propose an alternative solution to the concerns of those who currently target dissent: educating policymakers and the public about the nature of scientific consensus and dissent, and the role each can and should play in policymaking (de Melo-Martín and Intemann 2013; 2014, p. 595, 604). de Melo-Martín and Intemann believe that this alternative will not only successfully facilitate sound policy, but that education is a "...better strategy for addressing the problem" because "...it avoids the additional dangerous consequences associated with targeting dissent" (2014, p. 604).

Without doubt, dMMI are right to highlight the way that flawed conceptual schemes can distort decision-making. By pointing to the way that false philosophies of science-informed policy can contribute to generating the consequences of problematic dissent, dMMI have made an important contribution to identifying the sorts of misconceptions that should be corrected, and ideas that should be covered, within education on science and society. They have also identified one high-level strategy that could be implemented to enhance non-experts' resilience to problematic dissent, and that may be efficacious in dampening its harmful consequences.

However, dMMI's argument that targeting dissent is (generally) misguided is unsuccessful. This is because there is an alternative set of assumptions that capture several considerations that dMMI overlook and that together make

---

only factor that can legitimately influence policy (de Melo-Martín and Intemann 2014, pp. 606–7). I don't focus on these false philosophies for two reasons: 1) they aren't dMMI's focus; 2) I take it that they are caricatures of science-informed policy that few, if any, contemporary scholars endorse.

it sound to target problematic dissent in some circumstances. I show this via the Probability Argument.

3.1. The Probability Argument

The Probability Argument can be summarized as follows:

> P1. Where a scientific hypothesis (H) is pertinent to policy (P), a person's level of support (or otherwise) for P can be influenced by their perception of the probability (Pr) that H is correct.
> P2. Non-experts rely on experts' testimony, as well as higher-order evidence—such as the degree[8] of expert agreement about Pr(H)—to form beliefs about Pr(H).
> P3. Problematic dissent can causally contribute to non-experts holding false or inaccurate perceptions of experts' first-order claims, as well as of higher-order evidence. This affects a non-expert's ability to form well-calibrated beliefs about Pr(H).
> P4. Targeting problematic dissent can prevent this speech from entering and circulating through the public knowledge system, or certain parts of this system, and/or can reduce its regularity and reach, and consequently its impacts. As such, targeting dissent can help some, perhaps many, people to more accurately perceive first- and higher-order features of the epistemic landscape, and hence, to form more accurate beliefs about Pr(H). Given the relationship between Pr(H) and P (see P1), some, perhaps many, people's attitudes towards P will therefore differ when certain problematic dissent is targeted, compared to a counterfactual world in which this problematic dissent is not targeted and perhaps even unwittingly helped to flourish.
> C. Targeting problematic dissent is a sound strategy for curbing the negative consequences of problematic dissent on policy in some, perhaps many, circumstances.

In what follows I discuss and defend each of these assumptions.

3.1.1. (P1) The Significance of the Perceived Probability that a Pertinent Hypothesis is Correct. In democratic societies, the development, enactment, and continuity of public policies (Ps) rests in part, and often to a considerable degree, on the extent to which potential voters (and to a lesser extent the public in general) support P. The extent to which an individual supports or opposes P partly reflects their subjective assessment of how well justified

8. Note that dMMI generally treat consensus as a binary, presence-absence phenomenon. I think it's more helpful to understand consensus as a scalar concept, and to talk about the degree and spread of expert (dis)agreement.

P is (Druckman and Lupia 2000).[9] This assessment partly turns on whether, and to what extent, they: believe that there is a need for P; support P's objectives; take P to be capable of meeting these ends; and are willing to accept trade-offs associated with P. These beliefs and attitudes are influenced by a person's values and normative views, in concert with their understanding of how the world is, forecasts about how the world could be, and best estimates of the likelihoods of such scenarios. For some policy issues, scientific information will be pertinent.

Where a scientific hypothesis (H) is relevant to P, how probable a person takes H to be—Pr(H)—can influence the person's assessment of how well justified (or not) P is.[10] For instance, whether, and the degree to which, exposure to second-hand smoke can elevate risks to non-smokers' health will be relevant to many people's subjective assessments of how well justified a policy that prohibits smoking in workplaces (P_{PSW}) is.[11] Therefore, the probability that a person assigns to the following hypothesis, for example, can influence their assessment of how well justified P_{PSW} is, and thus whether, and to what extent, they support or oppose P_{PSW}:

> H_C: Exposure to second-hand smoke in workplaces increases a non-smoker's risk of lung cancer, on average, by 15–20%.[12]

Ceteris paribus, the higher a person perceives $Pr(H_C)$ to be, the more justified they will take P_{PSW} to be, and the stronger their support (or the weaker their opposition). Importantly, it is possible that once some Pr(H) reaches a certain threshold, a person may then take P to be justified enough to support, or at least be neutral towards, P, all-things-considered. What this threshold is will depend on a person's values, among other factors, and will therefore be unique to each individual. Thresholds are also sensitive to contextual factors, e.g. may shift in response to changes in the status of other hypotheses.

9. By "support" I mean that that person would then act in ways that further P, rather than opposing P and behaving in ways that prevent or reverse P, or at least that their support of P would feature as such in their deliberations about all-things-considered decisions. I take "justified" to mean underpinned by good or legitimate reasons.

10. Consistent with the role probability plays in rival descriptive theories of decision (i.e. expected utility theory and prospect theory), as well as in key philosophies of mind (e.g., Clark 2015).

11. The tobacco industry's own research noted this. *The Roper Report* (1978, cited by CDC 2006) reported the widespread public belief that "What the smoker does to himself may be his business, but what the smoker does to the non-smoker is quite a different matter." It also predicted that, as the belief that second-hand smoke exposure could harm non-smokers became more widespread, public support for smoking restrictions would grow.

12. Of course, I am not saying that this is the only hypothesis or consideration someone could take to be important to their deliberations about P. I isolate one hypothesis here for illustrative purposes; ultimately many considerations are entangled in a complex web.

To illustrate, take León, who thinks that it is unlikely that second-hand smoke exposure can increase the average non-smoker's risk of lung cancer by 15–20% (i.e. he takes $Pr(H_C) = 0–0.33$). This, in conjunction with his strong normative beliefs about the importance of smokers' negative freedom and of government interference being undesirable, means that he initially strongly opposes P_{PSW}. By contrast, Frida is much more accepting of government regulation, and has a very low tolerance for risks of harm being imposed on others. She also takes $Pr(H_C) = 0–0.33$, but given her values she weakly supports P_{PSW}. Now imagine that at some later time León and Frida both come to accept that Pr(Hc) >= 0.95, i.e. that it is extremely likely that H_C is correct. With these updated beliefs (their values remain unchanged), León now weakly, and Frida very strongly, supports P_{PSW}.

3.1.2. (P2) Non-experts Depend on Expert Testimony and Higher-order Evidence to Form Beliefs About Pr(H). How León and Frida form their beliefs about H_C is important. When H relates to a domain of specialist knowledge, non-experts rely on expert testimony to provide them with the best knowledge about H available, including estimations of Pr(H).[13] Most straightforwardly, non-experts can defer to experts' assertions such that they directly employ experts' claims as premises in their own reasoning. But non-experts can also form impressions about Pr(H) more indirectly, e.g., León and Frida may have originally estimated $Pr(H_C) = 0–0.33$ because the media's reports were frequently along the lines of: "...whilst some medical scientists say it is virtually certain that exposure to second-hand smoke increases the risk of lung cancer in non-smokers by up to 20%, they remain deeply divided, with significant numbers of experts who dispute this claim, and who think there is zero chance this is the case."

Non-experts also use higher-order evidence—that is, evidence about putative experts and the processes they used to arrive at their claims—to form their beliefs about Pr(H). Higher-order evidence is often conveyed to non-experts by intermediaries, such as the media, when communicating putative experts' first-order claims. It includes (but is not limited to): the degree and/or spread of expert (dis)agreement; who agrees/disagrees, and why; indicators of contenders' competence, vis-à-vis the specific hypothesis; relevant potential interests and biases of contenders; indicators of honesty, and track records of integrity; how and why any consensus formed; the degree of meta-expert agreement, and other indicators of meta-expert and interactive expert appraisal (Goldman 2001; Coady 2006; Anderson 2011; Coady and Corry 2013, pp. 22–34; Lane 2014). That non-experts use higher-order evidence in this way also has empirical support. For example,

13. I simply take an expert to be someone whose competence in a domain is secure. They need not be a professional scientist.

several studies have demonstrated the causal role of the perceived degree of expert consensus in the belief formation of non-experts (Lewandowsky et al. 2013; van der Linden et al. 2015, 2017; Hamilton 2016; Maibach and van der Linden 2016). These studies found there to be greater convergence between non-experts' and experts' beliefs about the (non)existence of empirical phenomena as non-experts' perceptions of the degree of expert agreement became more accurate.

When experts disagree about Pr(H), or when a non-expert perceives there to be expert disagreement, higher-order evidence plays an especially important role in helping non-experts to adjudicate between conflicting first-order claims. Upon consideration of higher-order evidence, if a non-expert perceives some putative experts or the processes they used to lack credibility or trustworthiness, they may discount their testimony and take Pr(H) to be higher or lower than stated. This is positive when it helps non-experts to form more accurate beliefs. Perhaps León later accepted that $Pr(H_C) >= 0.95$ partly because he came to understand that only a handful of putative experts accepted $\neg H_C$, and that, although scientists, they lacked the necessary types of domain-specific expertise to competently assess the likelihood that H_C is correct. These evaluations, however, can go awry when the putative higher-order evidence non-experts base their assessments on is itself misleading, inaccurate, or false, as non-experts may then mistakenly discount, buy into, or inflate some testimony.

Critically, given the relationship between a person's beliefs about Pr(H) and their attitudes towards P, a non-expert's awareness and perception of the epistemic landscape, which includes higher-order evidence, can influence the extent to which they support or oppose P. Misperceptions of key features of the epistemic landscape can be difference making to a person's strength of support or otherwise for P, and in some cases, even to whether or not they support P, all-things-considered. For example, if a person misperceives the degree of expert agreement about some Pr(H) to be "X," when it is in fact "Z," it is possible they might fail to support P when a degree of agreement "Y" about Pr(H) would have been sufficient for their support. Or even if they correctly perceive the degree of expert agreement, they may misperceive this view to be that Pr(H) is "X," when it is in fact "Z," and they would have supported P if Pr(H) was at least "Y."[14] Thus, when non-experts' perceptions of the epistemic landscape are distorted—e.g., when they believe that there is much weaker expert agreement about an

14. This is reflected in studies that have found that for some policy issues, presumably those where empirical information is highly relevant, policy attitudes are linked to perceptions about the degree of expert agreement about pertinent empirical facts (e.g., see Ding et al. 2011).

empirical matter than there actually is—this can affect the probability they assign to H or ¬H, and consequently, their evaluations of P and actions with regard to P and related issues.

de Melo-Martín and Intemann consider something close when they say: "Presumably, the idea is that in order for a science-based policy to be justified, there must be good reason for thinking that the science is more likely to be true than to be false. If the existence of scientific consensus is thought to indicate that a theory is likely to be true, then the necessity of consensus for adopting a policy would seem to follow" (de Melo-Martín and Intemann 2014, p. 600). But they reject this because "...it is not clear that a consensus is the best indicator of truth. Presumably, what is important is not the existence of a consensus per se, but rather the fact that consensus was formed in epistemically appropriate ways" (2014, p. 600). However, note that on my account, Pr(H) need not be >0.5 (i.e., "more likely to be true than to be false") for a person to consider P to be justified (as illustrated by Frida's initial support for P, despite Pr = 0–0.33). Additionally, if a consensus *has* formed in an epistemically appropriate way, then the degree of consensus *is* one piece of meaningful higher-order evidence (Coady 2006), as dMMI themselves acknowledge.

3.1.3. (P3) Problematic Dissent can Contribute to Non-experts Holding False or Inaccurate Beliefs. A non-expert's ability to form beliefs about Pr(H) that are apportioned to the actual evidence can be adversely affected by problematic dissent in at least three key ways. First, when the erroneous claim "X," an instance of problematic dissent, is asserted about Pr(H), a non-expert may form the belief "X" by straightforwardly deferring to this assertion. They may do so because "X" is made to seem plausible, and the putative higher-order evidence presented makes the testifier appear credible and trustworthy and that there are no additional reasons to reduce one's credence or hold a different belief. Alternatively, "X" may be the only claim about Pr(H) available, or the most prominent, within that person's socio-epistemic environment[15]; there is some evidence that we tend to believe that those propositions that are more familiar to us are more likely to be true (Schwarz et al. 2007). Or, a non-expert might accept "X" because they are: engaged in motivated reasoning (Kunda 1990; Kraft, Lodge and Taber 2015); making inferential errors due to confirmation bias (Nickerson 1998); or because the assertion of "X" triggers other cognitive phenomena such as cultural cognition (Kahan et al. 2011).

15. This could be due to acts of omission. Under such circumstances, non-experts may not be given fair opportunity to form accurate beliefs about Pr(H). I put this issue to one side for this paper to focus on actual communicative acts.

Second, a non-expert might form the inaccurate belief "Y" about Pr(H), by using the variation between putative experts' competing claims (e.g., "Z," which is correct, and "X") to arrive at some value for Pr(H) in between what they perceive to be two equally credible claims. In such cases, dissenting speech, or the way it is presented, modifies non-experts' perceptions of Pr(H) more indirectly by influencing their perceptions of higher-order evidence. When a problematic dissenting claim is asserted, it can be done so in a way that misrepresents (exaggerates) its epistemic credibility, and/or misrepresents (understates) the epistemic credibility of opposing claims. Methods can be framed as reliable when they are unreliable. On the other hand, legitimate scientific practices can be framed as suspicious or duplicitous when they are in fact uncontroversial. Putative experts can be falsely accused of scientific fraud, or they can be engaged in fraudulent activity without non-experts being any the wiser. How qualified an interviewee is to comment on the status of a particular scientific hypothesis can be exaggerated, or on the contrary, downplayed. The degree of expert (dis) agreement can be skewed; intermediaries and informants can engage in "false balance" (Boykoff and Boykoff 2004), or plain bias (Manne 2011, p. 50–54), and thus lead non-experts to perceive experts to be more divided than they really are, and so on.

Third, some dissent can misrepresent experts' testimony about first order facts whilst exploiting genuine higher-order evidence to lend credibility to the false or inaccurate statements made about experts' first-order claims. For example, early in 2013, the *Australian*, Australia's widest circulating national newspaper, ran a front-page story with a headline that asserted, "Sea rise 'not linked to warming'."[16] This article was supposedly based on the findings of a team of climate scientists, Gregory et al. (2013), and commenced with the pronouncement that, "The latest science on sea level rises has found no link to global warming...." But this claim was patently false; the article grossly misrepresented Gregory et al.'s research and conclusions, as well as the state of scientific knowledge about sea level rise more generally. Dr John Church, one of the study's authors, said of article: "Sea level clearly is linked to climate change, it clearly is linked to greenhouse gases and that was in the paper quoted by the *Australian*. The quote is, I am sorry, inaccurate" (quoted in Creagh 2013).

Whilst in this case the *Australian* retracted the online version of this article and issued a correction in print, this isn't necessarily sufficient. Retractions and corrections are often ineffective because it can be difficult to undo false or unsupported beliefs once they have taken hold (Gilbert et al. 1990;

16. The article no longer appears online, but a copy of the print version can be viewed at: https://doi.org/10.6084/m9.figshare.5481100.v1

Thorson 2016). Discredited and corrected misinformation can also have a powerful ongoing effect on people's memory and reasoning (Lewandowsky et al. 2012), and moreover, sometimes even make matters worse: the "backfire effect" suggests that correcting false beliefs can work to further entrench those beliefs (Kuklinski et al. 2000; Nyhan and Reifler 2010; Nyhan et al. 2013). Corrections can also result in misinformation becoming more salient, which is problematic because, as noted earlier, we tend to believe that propositions familiar to us are likely to be true. This all only serves to worsen the impact of problematic dissent, and of course means that those who actually do intentionally mislead others for their own ends have additional incentives to propagate misinformation in the first place.

It's not hard to imagine then, how certain types of dissent could have led León and Frida to initially perceive expert opinion on H_C to be deeply divided when in fact there was a very high degree of expert agreement that H_C was virtually certain (i.e., Pr = 0.99–1), and there were good reasons to think this strong consensus had formed in epistemically appropriate ways. Owing to this dissent, León may have failed to support a policy that he would have at least weakly supported, absent this distortion in his understanding of the epistemic landscape.[17] But most importantly, notice that León and Frida did not hold false philosophies of science-informed policy-making: they did not take a scientific consensus per se to be necessary or sufficient to justify policy (as evidenced by Frida's initial support of P_{PSW} despite her perception that experts were divided). Nor did they think that a unanimous expert consensus was required (both supported P_{PSW} when they still perceived there to be experts who rejected H_C), that the science needed to be certain (both supported P_{PSW} whilst perceiving there to still be a 0–5% chance H_C was incorrect), or that scientific knowledge was the only factor that could legitimately influence their policy preferences (both Frida and León's values influenced their preferences). The issue here (particularly in the case of León, who initially did not support a policy he would have otherwise supported) was instead that they were unable to form well-calibrated beliefs about Pr(H), primarily because they were unable to accurately perceive the degree of agreement among experts and other higher-order evidence. This was either because they did not have access to the requisite information and evidence, or because they personally

17. This also serves to illustrate that the greater the misalignment of one's perception of certain facts and the actual facts, the more likely it is that one will be less successful in achieving their own goals, or living their life in a way that is consistent with their values. This is likely to be morally and politically significant when these beliefs were not formed voluntarily, or when the consequences of holding a misperception fall on a person's dependents or on other people. I do not explore this particular issue further in this paper.

lacked the capabilities required to make competent judgments about the epistemic credibility of competing claims and evidence. Being embedded within socio-epistemic environments that failed to provide this evidence and that was rich in misinformation and distortions, they could not distinguish between dissent that did present a real challenge to the consensus position and dissent that did not.

3.1.4. (P4) Targeting Problematic Dissent can Assist Non-experts to Form Accurate Beliefs. I'll now explain how the three strategies de Melo-Martín and Intemann raise as being commonly used to target dissent can assist some (perhaps many) people to more accurately perceive epistemic features pertinent to their practical reasoning. First, imagine a psychology lecturer who chooses to initially mask 1) the discredited claim that non-heterosexuality is itself a mental illness and 2) the presence of a minority of psychiatrists who dissent from the (now) expert consensus, and official position of societies like the American Psychiatric Association, that non-heterosexuality is not a mental disorder. She chooses to do so because she has good reasons to suspect that many of her students have underlying prejudices towards non-heterosexual people, and as such is concerned that raising this dissent early within the course might trigger unconscious biases, making it harder to achieve learning objectives. Additionally, when she does eventually introduce her students to the past controversy and the presence of a dissenting minority who still believe non-heterosexuality should be classified and treated as a mental illness, she does not teach it as a balanced debate with two equally credible sides; she does not frame the dissidents' position as being on an epistemic par with that of their opponents (nor a moral one). Based on her experience, her sense is that these measures, in this context, facilitated better engagement with the issues discussed in class and likely helped at least some of her students to form more accurate beliefs than they otherwise would have if she had raised this dissent in the first lesson, or had not emphasized the consensus position throughout the course in certain ways.

Now let's consider how the *South African Medical Journal*'s (SAMJ) *silencing* of certain dissident views on AIDS from that particular forum helped non-experts to form more accurate empirical beliefs. At the time SAMJ made this decision (2003), South Africa's AIDS public health crisis was at its peak, with approximately one in four adults with HIV. Its President at the time, Thabo Mbeki, publicly denied the link between HIV and AIDS, as well as the efficacy of anti-retroviral (ARV) medication. He instituted policies denying HIV-positive citizens ARVs in parts of South Africa, and publicly justified and tried to legitimate these policies with reference to what he had accepted as empirical facts. If, in such circumstances, South Africa's most eminent medical journal had continued to publish dissenting articles denying the well-established link between HIV and AIDS, it

would have been conferring credibility on Mbeki's (and others') empirical assertions, and tacitly recommending the need for non-experts to give serious consideration to such views. Instead, by indicating that such articles no longer had a place in its journal because the evidence for the link between HIV and AIDS was so overwhelming, the SAMJ was providing non-experts with an important piece of higher-order evidence: that the experts associated with SAMJ did not take claims denying the link between HIV and AIDS to merit serious consideration. Such a move plausibly contributed, either directly or indirectly, to more South Africans coming to doubt the credibility of Mbeki's assertions, and how well justified his policies were, than they otherwise would have if the SAMJ continued to offer up their journal as a forum in which AIDS dissidents could express their views.

Finally, much of the scholarship dMMI characterize as a targeting strategy to discredit dissenters has in fact publicly revealed and discussed critical higher-order evidence, some of which had previously been actively suppressed and concealed from the public. Through the work of the scholars dMMI reference, such as Proctor, Michaels, Oreskes and Conway, Shrader-Frechette, and Elliott (among others), we now have a deeper understanding of the interests and biases, strategies, and misconduct of players in so-called scientific controversies.[18] Likewise, high-quality investigative science journalism in some cases has brought relevant higher-order evidence to light to be scrutinized by the public. Importantly, these scholars and journalists themselves often have various types of expertise—e.g. meta-expertise and interactive expertise[19]—and frequently have unique access to putative experts and evidence. Their scholarship and journalism can therefore be understood as a type of testimony too: about the credibility of different experts and their claims. Sometimes implicit within this testimony is their judgment that a consensus has been reached in epistemically appropriate ways. As such, it is valuable additional higher-order evidence that non-experts can use in forming their own beliefs.

Returning again to León, to the extent that his impression of the epistemic landscape was initially distorted by unsubstantiated dissent, or dissent that misrepresented others' positions or suppressed higher-order evidence, and if counterfactually this speech had been judiciously targeted in a way that successfully reduced its frequency and intensity, or its perceived credibility, it's possible—even probable, perhaps—that León would

18. Leuschner (2016) makes a similar argument.

19. Following Collins and Evans (2007), I take meta-expertize to be expertize used to judge other expertize and experts, and interactive expertize to be having necessary and sufficient knowledge and skill within a domain such that one can engage with contributory experts fluently, and in sophisticated ways.

have perceived significant features of the epistemic and policy landscapes more accurately. Given the relationship between a person's perception of first- and higher-order facts and their evaluation of how well justified policies are, León's initial attitude toward P_{PSW} most likely would have been different; in this case, more supportive.

For certain issues, these seemingly small differences in each person's perceptions, when combined in aggregate with all similar changes across a population, can result in a significant difference to the trajectory of policy. Take, for example, the 2003 Iraq war, a decision that significantly turned on, and was publicly justified with reference to, the alleged status of just a few key empirical claims, most famously that Iraq possessed and was developing weapons of mass destruction. In a 2003 study, Kull, Ramsey, and Lewis found that the majority (60%) of US citizens held at least one of three key misperceptions about empirical features that were cited by politicians to legitimate their decision to go to war; only 30% had no misperceptions. Moreover, they found that these misperceptions were highly related to people's attitudes towards the Bush Administration's decision to go to war, both before and after the war commenced; the presence of misperceptions was the most powerful predictor of support for the war, with those misperceiving 4.3 times more likely to support the war than those who did not misperceive. Further still, the presence of each additional misperception was associated with sharply higher support for the war (one misperception = 2.9 times more likely; two misperceptions = 8.1 times more likely; three misperceptions = 9.8 times more likely). It is plausible that it would have been significantly more difficult for Bush and other politicians to elicit and maintain support for the decision to go to war if the public had not held such misperceptions. By giving citizens incorrect and misleading information, support was gained for a policy. Whilst this example is not from science, I think it helps us to be more imaginative about the likely cumulative consequences on public policy when large proportions of the population within democracies hold significant misperceptions about key empirical matters.[20]

3.1.5. (C) Targeting Problematic Dissent can be a Sound Strategy to Curb its Negative Policy Consequences. To summarize: problematic dissent can interfere with non-experts' abilities to accurately perceive the contours of epistemic landscapes. This can in turn hinder a non-expert's ability to form accurate beliefs pertinent to their practical decision-making. These

20. This was the best data-backed example I could find to demonstrate this point. Not all public policies will have such a tight relationship to empirical features, but many do, and are reasonably perceived as such by significant proportions of populations (e.g., prohibitions on smoking in public places seems to be one).

inaccurate beliefs mean that some people's subjective evaluations of how justified a given policy is differ from what they would be in a counterfactual world in which this dissent was absent or reduced; this is true even when they do not hold false philosophies of science-informed policy. Targeting problematic dissent can prevent it from entering and circulating through the public knowledge system, or certain parts of this system, and/or can reduce its regularity, reach, and impact. As such, targeting dissent in pursuit of policy-related ends will not be misguided in some, perhaps many, circumstances. The Probability Argument therefore provides a *prima facie* case, and a *pro-tanto* reason, for targeting problematic dissent about science. Whether or not one should target dissent "all-things-considered," and if so, how, is a different matter, which I will discuss in §6.

3.2. Responses to Two Objections

Here I raise and respond to two objections. The first is that even if the Probability Argument shows that targeting dissent can sometimes influence the trajectory of policy, this trajectory will not necessarily bend towards sound policy (remember: "sound" policy is what dMMI take to be the aim of those who target problematic dissent). For example, if one's definition of sound climate policy is holding global warming to one degree Celsius, it seems unlikely that targeting problematic dissent about empirical claims would help to secure this end. However, if one took a much wider view of what counts as sound climate policy—e.g., for action, broadly construed rather than inaction—emerging evidence suggests that more accurate beliefs about higher-order evidence, such as the degree of scientific agreement about the existence of anthropogenic climate change, is an important gateway belief associated with increased support for policy action across the political spectrum (van der Linden et al. 2015).

Alternatively, someone might not be interested in the trajectory of public policy at all, nor in the content of policy being in some objective sense sound; they might question whether such a notion even makes sense. Instead, they might hold that what's most important in democratic societies is that when more people have better calibrated perceptions of the epistemic landscape, more people will be subjectively assessing policy as sound or unsound by the lights of their own value system and reasoning, rather than merely because they have distorted perceptions of empirical features. So, rather than being interested in the specific content of public policy, as dMMI presume, someone might instead be moved to target certain dissent because they are interested in securing a particular type of policymaking process. Those who target problematic dissent might object, for example, to the way that obscuring the truth about important empirical features works to prevent certain policy options from ever receiving serious

democratic consideration. With regards to climate policy, for example, what the domination of public debate with endless contestations of fundamental empirical features has ultimately achieved has been a constraining of both opportunities for political dissent within these arenas, and a covert narrowing of the political space over time as certain policy options have become physically impossible or otherwise unviable (e.g., holding global warming to one degree Celsius). In contrast to this kind of deterministic tapering, efforts to clarify important features of the epistemic landscape by targeting problematic dissent don't close down democratic deliberation or the range of policy possibilities, because the acceptance of such empirical features cannot determine policy. In stark contrast to the way that problematic dissent confuses, conceals, and constrains, this clarity opens up the range of feasible policy directions at a point in time. Having greater clarity about the epistemic landscape also helps to equip people to be more sceptical and critical of the justifications given by politicians for their preferred policy positions and makes it harder for politicians to hide the real reasons they support some policy.

Intemann (2017) and Pearce et al. (2017) are also concerned about democratic deficits in policymaking caused by quarrels over empirical facts. However, they think that these debates can either by resolved by other means (e.g., Intemann suggests more discussion of evidence and mechanisms than consensus) or side-stepped (e.g., Pearce et al. advocate greater discussion of values and policy options) to make policy progress. However, I'm sceptical that these untested strategies will be as effective as these authors believe. For one thing, I think it's likely that the factual questions they hope to avoid will inevitably re-appear in these conversations. I also don't think they manage to escape notions of consensus. For instance, Pearce et al. (2017, p. 4) claim that political progress was made on the Montreal Protocol largely due to the unexpected discovery of the Antarctic ozone hole rather than the scientific consensus about long-term ozone depletion. But they fail to acknowledge that part of the reason why this was accepted as a "hot crisis signal" was because there was a strong expert consensus that the hole existed and was unlikely to quickly disappear. Similarly, Intemann (2017, p. 201) urges scientists to communicate features of their theories or models that make them reliable or trustworthy, such as the ability to make novel predictions. But presumably a novel prediction only counts as such, and thus is meaningful in the way Intemann says it is, if the status of the prediction as novel has been backed by their peers. If instead there were significant disagreements among relevant experts over whether or not it counts as novel, or whether the prediction could even count as having been confirmed, then it's not clear how reliable or trustworthy a non-expert ought to take a claim about a novel prediction to be.

The second objection I anticipate is that the Probability Argument is just the information deficit model of science communication and policy-making in disguise. The central tenet of the information deficit model—a model widely rejected within the STS and science studies communities—is that any public scepticism or negative attitudes toward science, or a policy that has been informed by science, can be explained by people just not knowing enough; if they only knew more and better facts, they would accept the science, or support a policy that has been developed with reference to those empirical claims. Because the Probability Argument is motivated by a focus on the communication of information and evidence, I can see how someone might think that it shares this same tenet. However, the Probability Argument does not hold that every person's doubt or negative attitudes towards science or policy can be fully explained by not knowing enough, or in some cases at all. It only suggests that in some circumstances some people's doxastic attitudes about a scientific hypothesis can be partly explained by misperceptions of key features of epistemic landscape, and that in many cases these doxastic attitudes would differ in degree, or kind, if those people were provided with additional information, or if misinformation was reduced or eliminated within their socio-epistemic environments. The Probability Argument suggests that in some cases doing so will influence some people's degree of support or otherwise for a particular policy. These nuances distinguish the Probability Argument from the deficit model.

4. Is Targeting Dissent Dangerous?

So far, I have argued that de Melo-Martín and Intemann do not succeed in establishing that targeting dissent is misguided, even generally. What they have identified, however, is one potential part of the problem (false philosophies of science-informed policy), and one aspect of a possible solution (education). I take my argument in the first part of this paper to be sufficient to re-open the debate about the soundness of targeting dissent. Moving forward, I suggest that we focus on developing a better understanding of the specific conditions under which targeting dissent, or not targeting dissent, will be misguided or sound. However, making such judgments is inevitably bound up with questions about the riskiness of the consequences of pursing different courses of action.[21] Therefore, I now turn to dMMI's charge that targeting dissent is dangerous, which I understand to

21. In §6 I point out that before we can make these judgments, we first need to better understand, and make a case for our final values: what values we are and are not willing to trade-off along the way, as well as what is morally permissible (or even demanded), in a particular context.

mean that doing so can, or is likely to, cause unfavourable or harmful consequences. dMMI argue that targeting dissent is dangerous for three key reasons. Whilst I agree that all three reasons are genuine risks and legitimate concerns, I show that these same dangers can also be present in situations in which dissent is not targeted.

4.1. It Is Not Clear that Targeting Problematic Dissent Leads to an Increase in its Frequency

The first reason dMMI provide to support their contention that targeting dissent is dangerous is that targeting dissent is likely to lead to a greater frequency of problematic dissent (de Melo-Martín and Intemann 2014, p. 607). They suggest that this then signals to dissenters that contesting the science is an effective strategy, and thus provides them with an incentive to make misleading remarks, spread misinformation, and manufacture doubt. dMMI also claim that targeting problematic dissent suggests to listeners that the dissent targeted does appropriately challenge and weaken the consensus position, and therefore that the dissent targeted should be considered by non-experts when they are deciding what to believe.

However, it seems at least equally plausible, and perhaps even more plausible in some cases, that not targeting certain instances of problematic dissent could lead to an increase in its frequency; if nobody attempted to discourage or reduce the presence and efficacy of problematic dissent, there could be an even larger incentive to create and disseminate it. The presence of voices targeting problematic dissent may currently be operating as counter-vailing forces and disincentives, keeping the frequency and influence of problematic dissent (as well as its consequences) at reduced levels compared to a counterfactual world in which no targeting of dissent took place. Similarly, the targeting of some dissent about science could equally reflect precisely the opposite of what dMMI suggest: it could indicate to listeners that the dissent targeted does not in fact challenge or weaken the consensus position, and therefore that non-experts should not take it into account when forming their beliefs. I suggested that this was the case when the *SAMJ* refused to publish articles denying the link between HIV and AIDS. As I argued in §3.1.4, certain ways of targeting dissent can help facilitate and sustain accurate perceptions of various facts associated with a consensus position that has been reached through an appropriate process, for the right reasons. On the other hand, not targeting problematic dissent could implicitly send the message that the dissent in question is appropriately consensus weakening (when it is not), and that people should take it into account when forming their beliefs (when they should discount it). dMMI do not account for the way that claims allowed to circulate through the public knowledge system can become both

normalized merely by familiarity and legitimized by the social endorsement they are tacitly given, especially when those actors are perceived to be authoritative or epistemically privileged in some way. More evidence, especially empirical evidence, is needed to determine whether, and under what circumstances, targeting problematic dissent, or not targeting problematic dissent, is likely to lead to an increase in its frequency.

4.2. Not Targeting Problematic Dissent can also Create "Chilling Effects"

de Melo-Martín and Intemann also argue that targeting dissent is dangerous because doing so is likely to result in a "chilling effect," silencing dissenting voices that genuinely ought to weaken a prevailing expert consensus (de Melo-Martín and Intemann 2014, p. 608). These chilling effects, say dMMI, occur when scientists feel the need to self-censor to protect their careers and reputations, or when particular research and conclusions are suppressed in peer review, editorial processes, and funding decisions. Whilst there is no doubt that this type of chilling effect does occur, there is growing evidence that the presence of certain types of dissent about science has distinct chilling effects of its own; it too can lead to legitimate voices being stifled or silenced, or scientists being discouraged from making certain claims or researching certain topics (Kempner 2008; Biddle and Leuschner 2015; Lewandowsky et al. 2015; Sharman 2015; Leuschner 2016). Furman (2016) also helpfully provides an example from the policymaking arena: the way that the dissent of then South African President, Thabo Mbeki, about the cause of AIDS and the efficacy of ARVs, suppressed other voices (other dissent) within his party over policy. Where different chilling effects stand in a trade-off relationship, judgments will need to be made about which chilling effect is more problematic, and whose speech ought to be prioritized.

4.3. Targeting the Targeting of Problematic Dissent also Risks Stripping Away Resources Needed to Guard against Special Interest Science

Lastly, dMMI warn that targeting dissent can strip away the resources needed to guard against the influence of special interest science (de Melo-Martín and Intemann 2014, p. 607). The thought is that because vested interests can sometimes manufacture an expert consensus to further their own objectives, dissent is critical to our ability to successfully challenge these interests; by targeting problematic dissent in Case X, we may be discouraging the very sort of critique required to oppose the influence of vested interests in Case Y.

However, not targeting problematic dissent, as well as targeting the targeting of problematic dissent, could also discourage the very sorts of critique and actions required to oppose vested interests who manufacture dissent rather than consensus, or who are reckless and negligent when speaking about science. In doing so, these actions also seem to risk stripping away a key resource (i.e., the judicious targeting of problematic dissent) sometimes needed to guard against the influence of special interests. dMMI's argument here therefore seems more appropriate as a response to a position that all dissent in and about science is problematic and should be targeted, rather than my nuanced and particularistic position that some dissent is problematic, and that it can be sound, reasonable, and legitimate to target some problematic dissent in some circumstances. The onus is on dMMI to show that even the judicious targeting of dissent in delimited circumstances will have the effect of stripping away resources in the way that they contend, and further, that their own position does not unjustifiably strip away a resource that is needed and legitimate in some contexts.

5. Education and Targeting Dissent

Based on dMMI's criteria for an action counting as "dangerous," it seems that the jury is still out as to whether, in a particular circumstance, targeting dissent or not targeting dissent will be the risker option. But even granting this, and even if one accepts my arguments in §3, one might still argue that not targeting dissent simply ought to be preferred because it is more likely to be more efficacious and less dangerous than targeting dissenting speech, i.e. it will have a more desirable net effect, all-things-considered. Although I do think that this will be the case in some circumstances, in this section I aim to cast further doubt on this position as a more general conclusion by critically examining the soundness of, and the risks associated with, dMMI's proposed alternative: educating policymakers and the public to correct false philosophies of science-informed policy. I will also briefly explore challenges associated with education solutions more broadly.

5.1. It is Unclear How Efficacious Education that Corrects False Philosophies of Science-informed Policy Will Be

The chief weakness of dMMI's alternative to targeting problematic dissent is that despite claiming that the prevalence of false philosophies of science-informed policy is the "real problem" (de Melo-Martín and Intemann 2014, pp. 604, 609), dMMI do not provide any evidence to support their conclusion that it is these specific erroneous beliefs that are significantly causally responsible for the negative consequences problematic dissent generates. Particularly important here would be empirical evidence of

what proportion of non-experts hold such beliefs, and how correcting these particular false beliefs in some sub-population can be reasonably expected to make a significant difference. As dMMI do not provide this information, what positive impact we can anticipate education to correct false philosophies of science-informed policy to have remains very unclear. This is especially because issues will persist even when people have perfect beliefs about science-informed policymaking if non-experts are still unable to perceive various empirical features relevant to their decision-making with adequate accuracy, as I argued in §3.

A further challenge for dMMI's proposal is that it is also possible for problematic dissent to be deployed to undermine non-experts' understanding of science-informed policy. This extends Oreskes and Conway's observation that a key aspect of the Tobacco Strategy has often involved spreading erroneous understandings of scientific practices (Oreskes and Conway 2010, pp. 34, 267–74). Should the focus turn to educating non-experts about science-informed policy, this is probably what we should expect to happen. Notably, the infamous "Luntz Memo" included talking points on this front: e.g., he recommended that Republicans emphasize "...the importance of acting only with all the facts in hand" (emphasis in the original) (Luntz 2003, pp. 137–8). dMMI's solution may therefore simply involve pushing the problem back a step, and it's not clear that the problems associated with misinformation and misrepresentation can be overcome without targeting at least some problematic dissent, at some level or stage, or within at least some parts of the public knowledge system.

5.2. Challenges for Any Education Solution

However, some might still try to maintain that there remains a way we can educate away the problems to avoid the negative consequences of problematic dissent. Towards the end of their article, dMMI deviate from their main proposal (correcting false philosophies of science-informed policy through education) to claim that we should simply educate non-experts in such a way that they themselves are able to "...distinguish between dissent that is appropriately consensus-undermining and that which is not" (de Melo-Martín and Intemann 2014, p. 604); remember, this is what I noted as being León's fundamental problem. Whilst it is unclear what kind of education dMMI envisage here, note that if this were achieved, the third premise of the Probability Argument—that some dissent can contribute to non-experts holding false or inaccurate beliefs—would fail. At first blush such a solution seems to be unobjectionable; who would deny such capabilities for all? If everyone could successfully sift truth and falsity for themselves it would of course mean that it would be virtually

impossible for anyone to be misled by others' problematic dissent. In fact, it would ultimately mean that there would be no such thing as problematic dissent. But although this solution sounds ideal, once its deeper implications are probed it becomes clear that this suggestion does not adequately attend to several challenges and complexities associated with addressing problematic dissent through education in our non-ideal world.

Firstly, whilst it is currently wildly unclear what kind(s) and degree(s) of expertise people would need to competently evaluate the epistemic merits of dissenting speech, one possibility is that dMMI had in mind something like a mass education campaign to improve people's general critical reasoning skills. Scholars have been optimistic that the capacities needed to reason well about competing putative experts' claims are within reach for most people (e.g., see Anderson 2011), especially as they involve skills we already deploy when we assess everyday experts, like mechanics and doctors. Whilst I support such proposals in principle, I have several concerns about how realistic they are in practice, and therefore just how confident we should be about their ability to alleviate the consequences of problematic dissent in the absence of other measures. In all likelihood, such efforts will be starting from a low baseline of skills. Wineberg et al. (2016) found that even highly educated and digitally savvy students at Stanford University have very poor reasoning skills in evaluating the credibility of online sources. Of course, it could be the case that those with less formal education are actually better at these tasks. But without this evidence, such findings should at least give us moment for pause. Ensuring everyone develops sufficient capacity for even the most basic of critical tasks, perhaps especially in societies with stark pre-existing educational inequalities, is likely to be extremely difficult.

Moreover, reaching large numbers of adults, most of whom are no longer in formal education, would be an enormous challenge (as dMMI acknowledge). One of the only extant forums for such education is the mass media. But large parts of the media have played, and continue to play, a significant role in generating, relaying, and amplifying problematic dissent (Boykoff 2011; Painter 2011). In capitalist media markets that are subject to only minimal regulation, sensationalism and even falsity, is incentivized. It is therefore hard to see the media being used to carry out any kind of civic education without first at least partly addressing the underlying issues in media culture and norms of public communication that are currently aiding and abetting the mass distribution of misinformation. Even if an alternative channel or forum is created, its educative function could be undermined by the parallel existence of an unreformed network of influential entities that continue to transmit enormous amounts of misinformation and frequently

misrepresent others, including educators. But addressing media culture and norms of public communication, including issues associated with social media, is likely to require interventions that count as targeting problematic dissent. For example, whilst Robert Manne (Manne 2011, p. 114) calls for media outlets and journalists to engage in courageous criticism of rivals that practice unethical reporting, even this solution—a form of informal industry self-regulation—could plausibly count as a type of silencing or discrediting of dissenters.[22] Additionally, even possessing the best critical skills does not solve the problem of having adequate access to the right kinds of higher-order evidence to make use of these skills. And higher-order evidence, as I explained in §3, can be actively, negligently, or recklessly suppressed or distorted, often by the very intermediaries we reasonably rely on to provide this evidence to us.

Lastly, but perhaps most importantly, suggestions that narrowly focus on, and propose improvements via education to individuals' own cognition, in the hope that they will then be capable of sifting truth from falsity about specialist domains of knowledge themselves, risk being overly individualistic. Such solutions neglect the socially embedded and collective nature of human cognition and knowledge, and overlook several possibilities: that we may have certain epistemic or informational distributive entitlements (Coady 2010) that can be interfered with by certain types of dissent; that we could be subject to a type of epistemic injustice or epistemic oppression when our positive freedom to know something is restricted by particular dissenting communicative acts; that actors who occupy certain nodes within the public knowledge system may have special obligations to supply certain types of information, or to refrain from propagating misinformation or misrepresenting evidence, and that people can be wronged when these actors fail to discharge these responsibilities. If any of these possibilities hold, then the fundamental defect should not be viewed as residing primarily, or even at all, internally within individuals' own heads, but externally in the socio-epistemic environments they are embedded in, and upon which they reasonably depend to form beliefs about specialist domains of knowledge. Calls for non-experts to be generally left to make their own decisions about the accuracy of speech concerning such domains and placing the burden on individuals to successfully sift truth and falsity, may even actively foster the abrogation of epistemic responsibilities and

22. This is precisely how the *Australian* itself perceived Manne's critique of it and Manne's calls for others to engage in "courageous criticism" of the *Australian* (e.g., see reply to Manne by its Editor in Chief titled "A Critic Untroubled by Facts Who Seeks to Silence Dissent" (Mitchell 2011). Ironically, Mitchell ends the article by calling on editors at Fairfax and the ABC not to publish anything written by Manne.

create room for exploitation and political manipulation to take place. This would in turn aid the consolidation and reinforcement of problematic power structures that condition features of the public knowledge system, which can in turn work to prevent, or considerably delay, social and political paradigm shifts.

Even where education solutions appear to be successful, neglecting the correction of malfunctions and unethical practices within socio-epistemic systems may leave underlying structural problems and institutional dynamics intact and dormant, ready to re-emerge when education efforts can no longer keep pace with science and technology (if they ever could). Similarly, even if the challenges identified thus far could, over the long term, eventually be overcome without recourse to targeting dissent along the way, it would surely take an extremely long time to get to the point where there were no longer any significant negative consequences associated with problematic dissent (if it is even possible to reach this point). By this time, many negative downstream consequences may have already occurred, or been too late to prevent. The impacts that can be traced to certain dissenting communicative acts—including those non-epistemic consequences emanating from the failure or delay of certain policies being implemented, or actions being carried out—are the sorts of costs that need to be weighed against the anticipated benefits of not targeting problematic dissent. I further explain such evaluations in the next section.

6. Identifying Problematic Dissent and Choosing a Response

Based on my responses to de Melo-Martín and Intemann and the arguments I have defended in this paper, my conclusion—at least at this stage—is that the best general strategy to deploy to counter problematic dissent is pluralistic: we should simultaneously implement education efforts, whilst also demanding and working towards improvements in the integrity and proper functioning of the informational ecosystems within which individuals are situated, and upon which they reasonably depend. However, what particular strategy or strategies we ought to deploy in any given circumstance will be highly context dependent. In some circumstances, the most efficacious and ethical response will be to target some problematic dissent in some way. In other circumstances it will be better to respond to problematic dissent by critically evaluating it, and/or by educating listeners on the place of such dissent in policymaking processes. However, we shouldn't think that this will always be desirable or appropriate (e.g., when this dissent itself is likely to silence others), nor always be possible or the first-best option given limited resources of time, space, attention, etc.

My suggestion of embracing a plurality of approaches, rather than just the single strategy dMMI advocate, is further supported by the observation that targeting dissent and education are often not distinct activities. Whilst we have, up until now, treated targeting dissent and education as separate, unrelated, and mutually exclusive, this is largely a false dichotomy, as these activities are often entangled. Nowhere is this more apparent than in the case of the regulation of speech about tobacco products, which has involved the state curtailing the tobacco industry's freedom to publicly dissent over certain empirical claims that have been accepted as being beyond reasonable doubt. The Final Opinion of the case *United States v Philip Morris USA* even went as far as permanently enjoining (i.e., permanently silencing) the Defendants (tobacco industry representatives):

> ...from making, or causing to be made in any way, any material false, misleading, or deceptive statement or representation, or engaging in any public relations or marketing endeavor that is disseminated to the United States public and that misrepresents or suppresses information concerning cigarettes. (United States v. Philip Morris USA Inc. 2006, p. 3)

Tobacco companies are now also required by the state to include certain messages about health risks on their products and advertisements. Such measures are at once an example of targeting (silencing) dissent, and of education; the regulation of speech on tobacco products has been credited as one of the most far-reaching and effective aspects of education campaigns (Hammond 2011; U.S. National Cancer Institute and World Health Organization 2016). Thinking again of the examples of targeting dissent raised in this article, we can appreciate that each instance of targeting dissent simultaneously had an educative function, and therefore that it is often difficult to neatly separate targeting dissent from education.

Even so, one might worry that the pluralistic approach that I advocate assumes we can: (1) accurately identify problematic dissent, especially in the present when we need to act, rather than just in hindsight,[23] and (2) successfully select the most appropriate response/s to problematic dissent in any given circumstance. I have two replies to these very important concerns. First, despite the inherent uncertainties, we can sometimes be very confident, and justifiably so, about the status of certain dissent being problematic, e.g., public dissent sponsored by tobacco industry denying the link between smoking and cancer. Surely targeting this dissent, as we do today through regulating the tobacco industry's speech, has been and is still valuable, even if most of the damage was done before these

23. Thank you to an anonymous reviewer for pressing me on this point.

regulations were put in place. Second, it's possible that we currently under-estimate the extent to which we can make good judgments about dissenting speech about science in the moment. We can evaluate, for example, whether it has had sufficient expression across time and place, whether it has received adequate attention and response, the likelihood its expression will lead to epistemic or non-epistemic benefits or harms, whether those expressing it have a claim to expressing it or being heard within a particular forum, or whether some dissenting speech might actually suppress the speech and dissent of others.

Of course, we could, and most likely will, make mistakes about what is and is not problematic dissent, and how to appropriately respond to it; these judgments will necessarily be decisions made under uncertainty, and will involve epistemic and non-epistemic risks. As such, they will be value-laden decisions. But so too are decisions to not target problematic dissent, and this has generally not been properly acknowledged within the debate so far. There are no value-free or value-neutral moves; those who advocate not targeting dissent, or the position that we should address bad speech with more speech or education, are often merely assigning hefty weight and giving priority to epistemic values, such as a greater probability of obtaining new knowledge, over non-epistemic risks and harms. But this kind of Millian orthodoxy neglects the possibility that sometimes the things we take to be true really are true, and that various non-epistemic benefits can be worth the risk or even cost of some epistemic loss (Schauer 2012). What we need then, are well justified all-things-considered assessments of the status of specific dissent about science, and how we ought to respond to it in different contexts.

As my position is that these all-things-considered assessments and decisions are highly context-dependent, and thus should be made on a case-by-case basis rather than in the abstract,[24] I will not provide any of these arguments or conclusions here. What I will do, however, is provide a sketch of the sorts of considerations I think should factor into these evaluations and decisions, and how future scholarship by philosophers and science studies scholars could contribute. First, we need to consider both the positive and negative epistemic and non-epistemic consequences of speech acts about science, and of any subsequent response to such speech. Unfortunately, we currently lack a good grasp of a fuller range of these consequences, as philosophers and science studies scholars have, to date, overly focused on and often valorized the epistemic benefits of dissent about

24. Perhaps this even explains why, as dMMI questioningly point out (de Melo-Martín and Intemann 2014, p. 602), dissent that has differing characteristics is often targeted for what seem to be "unsystematic" reasons.

science at the expense of giving proper attention to understanding its negative non-epistemic consequences. To complicate matters more, some of these benefits and losses will stand in trade-off relations and are likely to be different in different parts of the public knowledge system and vary depending on who the speakers and listeners are. As the debate about dissent in and about science parallels, but lags well behind, progress that has been made in the free speech debate more broadly, it would benefit from closer connections to this scholarship.

Second, scholars discussing dissent should be more transparent about: the values encapsulated by evaluations of dissent as problematic or not problematic, and charges that certain ways of responding to dissent are dangerous; the values one thinks a particular response to dissent can help achieve or risks undermining; and the values one is and is not willing to trade off to secure other values. Because these activities are normative, it seems that moral, social and political philosophy will need to play a much greater role in these debates than they have to date.

Third, we need a better understanding of the chances associated with different means having different ends, in different contexts. Scholars should make greater use of empirical research to provide credible evidence of the potential for different strategies to achieve particular objectives, or have certain consequences or side-effects, in different contexts. However, at the same time, there is a need to critique this research, especially the validity of its conclusions and how far findings are warranted to be generalized. We should also be mindful that the evidence required might not yet exist, that there may be genuinely competing theories and models within this literature, or that different models, theories, and findings apply to different individuals, sub-populations, or scenarios.

Finally, a brief comment on terminology choice. Throughout this article I used de Melo-Martín and Intemann's language of targeting dissent to aid the tracing of arguments between articles. However, "targeting" is a loaded word, as it commonly refers to the object of an attack. I think the use of such language has the effect of unfairly and unduly influencing a reader's attitude towards such responses before they have had an opportunity to properly engage with the substantive arguments, and largely via an unconscious mechanism. Therefore, I suggest the term "checking" should be used in its place, where to check dissent means to halt or slow its progress, or prevent it from entering some part of the public knowledge system. An added benefit of employing this terminology is that because checking also means to examine something to determine its accuracy, quality, or appropriateness, it reminds us that before we check dissent (in the first meaning of the word), we must check it (examine it), carefully and thoroughly, reflect on it, and ensure we have good reasons for our subsequent actions.

7. Conclusion

I have argued that de Melo-Martín and Intemann's argument in *"Who's Afraid of Dissent"* is unsuccessful: it is far from clear that checking problematic dissent about science is even generally misguided and/or dangerous. Under some conditions, checking dissent will not be misguided: The Probability Argument shows that checking dissent can help non-experts to more accurately perceive critical features of epistemic and policy landscapes, and therefore assist people to form well-calibrated empirical beliefs relevant to their normative policy-related decisions. It also demonstrates that checking dissent can help to secure other ends unrelated to policy content. In critiquing dMMI's claim that checking dissent is dangerous, I did not argue that checking dissent does not carry risks; rather, I demonstrated that the arguments forwarded by dMMI also apply to not checking dissent and highlighted the reasons we have to doubt that dMMI's proposed education alternative will be efficacious and riskless in several contexts.

Once a fuller account of the potential negative risks and consequences associated with dissenting speech acts about science are brought into sharper relief and doubt is cast on the risklessness of refraining from checking dissent and addressing the problem alternatively through education, it becomes very plausible that certain ways of checking certain types or instances of dissent could, in some circumstances, be the less misguided and dangerous action, or be complementary to, or even sometimes an aspect of, education. We should not rule out the soundness or reasonableness of checking dissent, or of any other response to problematic dissent, *a priori*, but rather should adopt a nuanced and contextual all-things-considered approach.

References

Anderson, E. 2011. "Democracy, Public Policy, and Lay Assessments of Scientific Testimony." *Episteme* 8 (2): 144–164.

Biddle, J. B., and A. Leuschner. 2015. "Climate Skepticism and the Manufacture of Doubt: Can Dissent in Science Be Epistemically Detrimental?" *European Journal for Philosophy of Science* 5 (3): 261–278.

Biddle, J. B., Kidd, I. J., and A. Leuschner. 2017. "Epistemic Corruption and Manufactured Doubt: The Case of Climate Science." *Public Affairs Quarterly* 31 (3): 261–278.

Boykoff, M. T., and J. M. Boykoff. 2004. "Balance as Bias: Global Warming and the US Prestige Press." *Global Environmental Change* 14 (2): 125–136.

Boykoff, M. T. 2011. *Who Speaks for the Climate?: Making Sense of Media Reporting on Climate Change*. Cambridge: Cambridge University Press.

Centers for Disease Control and Prevention (CDC). 2006. *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta: Office on Smoking and Health.

Clark, A. 2015. *Surfing Uncertainty: Prediction, Action, and the Embodied Mind*. Oxford: Oxford University Press.

Coady, D. 2006. "When Experts Disagree." *Episteme* 3 (1–2): 68–79.

Coady, D. 2010. "Two Concepts of Epistemic Injustice." *Episteme* 7 (2): 101–113.

Coady, D., and R. Corry. 2013. *The Climate Change Debate: An Epistemic and Ethical Enquiry*. Basingstoke: Palgrave Macmillan.

Collins, H. and R. Evans. 2007. *Rethinking Expertise*. Chicago: University of Chicago Press.

Cook, J. 2017. "Response by Cook to 'Beyond Counting Climate Consensus'." *Environmental Communication* 11 (6): 733–735.

Cook, J. and S. van der Linden. 2017. "Facts Versus Feelings Isn't the Way to Think About Communicating Science." *The Conversation*, 5 July 2017: https://theconversation.com/facts-versus-feelings-isnt-the-way-to-think-about-communicating-science-80255.

Cook, J., N. Oreskes, P. T. Doran, W. R. L. Anderegg, B. Verheggen, E. W. Maibach, J. S. Carlton, S. Lewandowsky, A. G. Skuce, S. A. Green, D. Nuccitelli, P. Jacobs, M. Richardson, B. Winkler, R. Painting, and K. Rice. 2016. "Consensus on Consensus: A Synthesis of Consensus Estimates on Human-Caused Global Warming." *Environmental Research Letters* 11 (4): 048002.

Creagh, S. 2013. "Solar Forcing Effect on Climate Change 'Extremely Small': IPCC scientist." *The Conversation*, 14 January 2013: https://theconversation.com/solar-forcing-effect-on-climate-change-extremely-small-ipcc-scientist-11589

de Melo-Martín, Immaculada, and Kristen Intemann. 2013. "Scientific Dissent and Public Policy." *EMBO Reports* 14 (3): 231–235.

de Melo-Martín, Immaculada, and Kristen Intemann. 2014. "Who's Afraid of Dissent? Addressing Concerns About Undermining Scientific Consensus in Public Policy Developments." *Perspectives on Science* 22 (4): 593–615.

Ding, D., E. W. Maibach, X. Zhao, C. Roser-Renouf, and A. Leiserowitz. 2011. "Support For Climate Policy and Societal Action Are Linked to Perceptions About Scientific Agreement." *Nature Climate Change* 1 (9): 462–466.

Druckman, J. N., and A. Lupia. 2000. "Preference Formation." *Annual Review of Political Science* 3 (1): 1–24.

Furman, K. 2016. *AIDS Denialism in South Africa: A Case Study in the Rationality and Ethics of Science Policy*. Unpublished Doctoral Dissertation. London School of Economics and Political Science.

Gilbert, D. T., D. S. Krull, and P. S. Malone. 1990. "Unbelieving the Unbelievable: Some Problems in the Rejection of False Information." *Journal of Personality and Social Psychology* 59 (4): 601–613.

Godlee, F., J. Smith, and H. Marcovitch. 2011. "Wakefield's Article Linking MMR Vaccine and Autism Was Fraudulent." *British Medical Journal* 342: c7452.

Goldman, A. 2001. "Experts: Which Ones Should You Trust?" *Philosophy and Phenomenological Research* 63 (1): 85–110.

Gregory, J. M., N. J. White, J. A. Church, M. F. P. Bierkens, J. E. Box, M. R. Van den Broeke, ..., and L. F. Konikow. 2013. "Twentieth-Century Global-Mean Sea Level Rise: Is the Whole Greater Than the Sum of the Parts?" *Journal of Climate* 26 (13): 4476–4499.

Hamilton, L. C. 2016. "Public Awareness of the Scientific Consensus on Climate." *SAGE Open* October–December 2016: 1–11.

Hammond, D. 2011. "Health Warning Messages on Tobacco Products: A Review." *Tobacco Control* 20 (5): 327–337.

Intemann, K. 2017. "Who Needs Consensus Anyway?" *Public Affairs Quarterly* 31 (3): 189–208.

Kahan, D. M., H. Jenkins-Smith, and D. Braman. 2011. "Cultural Cognition of Scientific Consensus." *Journal of Risk Research* 14 (2): 147–174.

Kempner, J. 2008. "The Chilling Effect: How Do Researchers React to Controversy?" *PLOS Medicine* 5 (11): 222.

Kitcher, P. 2011. *Science in a Democratic Society*. New York: Prometheus Books.

Kraft, P. W., M. Lodge, and C. S. Taber. 2015. "Why People 'Don't Trust the Evidence': Motivated Reasoning and Scientific Beliefs." *The ANNALS of the American Academy of Political and Social Science* 658 (1): 121–133.

Kuklinski, J. H., P. J. Quirk, J. Jerit, D. Schwieder, and R. F. Rich. 2000. "Misinformation and the Currency of Democratic Citizenship." *The Journal of Politics* 62 (3): 790–816.

Kunda, Z. 1990. "The Case for Motivated Reasoning." *Psychological Bulletin* 108 (3): 480–498.

Lane, M. 2014. "When the Experts Are Uncertain: Scientific Knowledge and the Ethics of Democratic Judgment." *Episteme* 11 (1): 97–118.

Leuschner, A. 2016. "Is it Appropriate to 'Target' Inappropriate Dissent? On the Normative Consequences of Climate Skepticism." *Synthese*. Online First 15 November 2016: https://doi.org/10.1007/s11229-016-1267-x pp. 1–17.

Lewandowsky, S., U. K. H. Ecker, C. M. Seifert, N. Schwarz, and J. Cook. 2012. "Misinformation and Its Correction: Continued Influence and Successful Debiasing." *Psychological Science in the Public Interest* 13 (3): 106–131.

Lewandowsky, S., G. E. Gignac, and S. Vaughan. 2013. "The Pivotal Role of Perceived Scientific Consensus in Acceptance of Science." *Nature Climate Change* 3 (4): 399–404.

Lewandowsky, S., N. Oreskes, J. S. Risbey, B. R. Newell, and M. Smithson. 2015. "Seepage: Climate Change Denial and Its Effect on the Scientific Community." *Global Environmental Change* 33: 1–13.

Luntz, F. c. 2003. "The Environment: A Cleaner, Safer, Healthier America." Pp. 131–146 in *The Luntz Research Companies—Straight Talk*. Unpublished Memo. Copy accessed at: https://www.sourcewatch.org/index.php/File:LuntzResearch.Memo.pdf on 6 October 2017.

Maibach, E. W., and S. L. van der Linden. 2016. "The Importance of Assessing and Communicating Scientific Consensus." *Environmental Research Letters* 11 (9): 091003.

Manne, R. 2011. *Bad News: Murdoch's Australian and the Shaping of the Nation*. Collingwood: Black Inc.

Michaels, D. 2008. *Doubt is Their Product*. Oxford: Oxford University Press.

Mitchell, C. 2011. "A Critic Untroubled By Facts Who Seeks to Silence Dissent." *The Australian*, September 17 2011. Accessed at: http://www.theaustralian.com.au/business/media/a-critic-untroubled-by-facts-who-seeks-to-silence-dissent/news-story/a4b03dc8568e4c6e8fdedc032a656ece on 14 January 2018.

Nickerson, R. S. 1998. "Confirmation Bias: A Ubiquitous Phenomenon in Many Guises." *Review of General Psychology* 2 (2): 175–220.

Nyhan, B., and J. Reifler. 2010. "When Corrections Fail: The Persistence of Political Misperceptions." *Political Behavior* 32 (2): 303–330.

Nyhan, B., J. Reifler, and P. A. Ubel. 2013. "The Hazards of Correcting Myths About Health Care Reform." *Medical Care* 51 (2): 127–132.

Oreskes, N. 2004. "The Scientific Consensus on Climate Change." *Science* 306 (5702): 1686–1686.

Oreskes, N. 2017. "Response by Oreskes to 'Beyond Counting Climate Consensus'." *Environmental Communication* 11 (6): 731–732.

Oreskes, N., and E. M. Conway. 2010. *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*. London: Bloomsbury.

Painter, J. 2011. *Poles Apart*. Oxford: Reuters Institute for the Study of Journalism.

Pearce, W., R. Grundmann, M. Hulme, S. Raman, E. Hadley Kershaw, and J. Tsouvalis. 2017. "Beyond Counting Climate Consensus." *Environmental Communication* 11 (6): 723–730.

Schauer, F. 2012. "Social Epistemology, Holocaust Denial, and the Post-Millian Calculus." Pp. 129–43 in *The Content and Context of Hate Speech: Rethinking Regulation and Responses*. Edited by M. Herz and P. Molnar. Cambridge: Cambridge University Press.

Schwarz, N., L. J. Sanna, I. Skurnik, and C. Yoon. 2007. "Metacognitive Experiences and the Intricacies of Setting People Straight: Implications for Debiasing and Public Information Campaigns." *Advances in Experimental Social Psychology* 39: 127–161.

Sharman, A. 2015. *The Impact of Controversy on the Production of Scientific Knowledge*. Working Paper (No. 207). London: Grantham Research Institute on Climate Change and the Environment.

Thornton, P. 2013. "On Letters from Climate-Change Deniers." *Los Angeles Times*, 8 October 2013. Accessed at: http://beta.latimes.com/opinion/opinion-la/la-ol-climate-change-letters-20131008-story.html

Thorson, E. 2016. "Belief Echoes: The Persistent Effects of Corrected Misinformation." *Political Communication* 33 (3): 460–480.

U.S. National Cancer Institute and World Health Organization. 2016. *The Economics of Tobacco and Tobacco Control*. National Cancer Institute Tobacco Monograph 21. NIH Publication No. 16-CA-8029A. Bethesda: U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute; and Geneva: World Health Organization.

United States v. Philip Morris USA Inc., 449 F. Supp. 2d 1 (D.D.C. 2006). *Final Judgment and Remedial Order #1015*, 16 August 2006.

van der Linden, S. 2016. "Why Doctors Should Convey the Medical Consensus on Vaccine Safety." *Evidence-Based Medicine* 21 (3): 119.

van der Linden, S. L., A. A. Leiserowitz, G. D. Feinberg, and E. W. Maibach. 2014. "How to Communicate the Scientific Consensus on Climate Change: Plain Facts, Pie Charts or Metaphors?" *Climatic Change* 126 (1–2): 255–262.

van der Linden, S. L., C. E. Clarke, and E. W. Maibach. 2015. "Highlighting Consensus Among Medical Scientists Increases Public Support For Vaccines: Evidence From a Randomized Experiment." *BMC Public Health* 15: 1207.

van der Linden, S., A. Leiserowitz, and E. W. Maibach. 2016. "Communicating the Scientific Consensus on Human-Caused Climate Change is an Effective and Depolarizing Public Engagement Strategy: Experimental Evidence from a Large National Replication Study." Available at SSRN: http://dx.doi.org/10.2139/ssrn.2733956

van der Linden, S., A. Leiserowitz, S. Rosenthal, and E. W. Maibach. 2017. "Inoculating the Public against Misinformation about Climate Change." *Global Challenges* 1 (2): 1600008.

van Niekerk, J. P. 2003. "Politics Must Move Mainstream On AIDS." *South African Medical Journal* 93 (3): 154.

Wineberg, S., S. McGrew, J. Breakstone, and T. Ortega. 2016. *Evaluating Information: The Cornerstone of Civic Online Reasoning*. Stanford Digital Repository. Accessed at: http://purl.stanford.edu/fv751yt5934